FAIRFIELD COUNTY MATH LEAGUE (FCML) 2012-2013

Match 1 Round 1
Arithmetic:
Percents

1.) $\frac{50}{3}$ or $16\frac{2}{3}$

2.) $280 billion

3.) $\frac{1309}{1311}$

1.) At PC Jenney's, an item's original price is discounted by 20% the first week, an additional 25% the second week, and then x% on the third week. If the new price is exactly half the original price, find x.

2.) In 2011, the defense budget of a certain country was 40% of the national budget. In 2012, the national budget increased by $80 billion. The defense budget increased by $4 billion and was only 30% of the national budget. What was the country's national budget in 2012?

3.) Stocks ABC and XYZ have the same value on Day 0. On Day 1, the value of stock ABC increases by 5% and the value of stock XYZ decreases by 5%. On Day 2, the value of stock ABC decreases by 15% and the value of stock XYZ increases by 15%. On Day 3, the value of stock ABC increases by 10% and the value of stock XYZ decreases by 10%. Express the ratio of the new value of stock ABC to the new value of stock XYZ as a ratio of integers in lowest terms.

FAIRFIELD COUNTY MATH LEAGUE (FCML) 2012-2013

Match 1 Round 2
Algebra I: Equations

1.) $x = 13$

2.) $y = 6$ or $y = -5$

3.) $z = -1$ or $z = \frac{-10}{9}$

1.) Solve for x: $3(x+2) - \frac{x-4}{3} = 5(x-4) - \frac{x+2}{5}$

2.) Solve for y: $3 - \frac{y}{y+2} = \frac{36}{y^2 - 2y - 8}$

3.) Solve for z: $(6z+7)(8z+9) = (10z+11)(12z+13)$

FAIRFIELD COUNTY MATH LEAGUE (FCML) 2012-2013

Match 1 Round 3
Geometry:
Triangles
And Quadrilaterals

1.) $32+4\sqrt{13}$

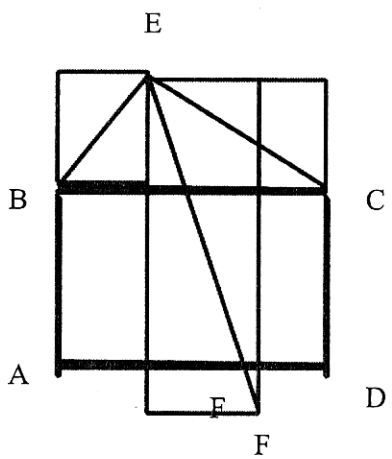
2.) $\frac{1200}{49}$

3.) $\frac{15+5\sqrt{3}}{3}$

1.) An isosceles trapezoid has bases 12 and 20 units and area 96 square units. Find the perimeter of the trapezoid.

2.) Rectangle ABCD has AB=CD=6 units and AD=BC =8 units. A ray is drawn from A that bisects angle BAD and intersects diagonal BD at E. Find the product of BE and ED.

3.) Triangle BEC is a right triangle with the right angle at E and BE = 5 cm and EC = $5\sqrt{3}$ cm. The triangle shares side BC of rectangle ABCD as shown and rectangle ABCD has area 50 cm^2. A median of the triangle is drawn from E to side BC and meets side AD of the rectangle at F. How long is AF?



Note: Not drawn to scale

FAIRFIELD COUNTY MATH LEAGUE (FCML) 2012-2013

Match 1 Round 4
Algebra 2:
Simultaneous
Equations

1.) x= 3 y= -1.5

2.) a= $\frac{-9}{2}$ b= $\frac{8}{3}$

3.) p= $\frac{1}{2}$ q= $\frac{2}{3}$ r= $\frac{1}{5}$

1.) Solve for x and y

$2x + 3(y+2) = 5(2x+3y)$

$4x - 2(y+3) = x-4y$

2.) Solve for a and b:

$\frac{2}{a+4} - \frac{3}{b-3} = 5$

$\frac{5}{a+4} - \frac{4}{b-3} = 2$

3.) Solve for p, q, and r:

$2p + 3q + 5r = 2$

$4p - 9q + 20r = -4$

$6p + 15q - 10r = 5$

FAIRFIELD COUNTY MATH LEAGUE (FCML) 2012-2013

Match 1 Round 5
Trig: Right Triangles

1.) $\frac{3\sqrt{13}}{13}$

2.) $200\sqrt{3}$

3.) 11

1.) In right triangle ABC, the right angle is at C and tan B = 2/3. What is sin A ?

2.) If you stand a certain distance from the base of a tower, the angle of elevation to the top of the tower is 60 degrees. If you move back away from the tower an additional 400 feet, the angle of elevation to the top of the tower is 30 degrees. What is the height of the tower in feet?

3.) A plane descends at an angle of 22 degrees below the horizontal. It reaches a certain altitude and then begins to ascend at an angle of 31 degrees above the horizontal until it reaches its original height. If the difference in horizontal position between the two times when it was at the original height is 10 kilometers, find the total distance traveled by the plane using the table below to the nearest kilometer.

	Sine	Cosine	Tangent
22 degrees	0.37	0.93	0.40
31 degrees	0.52	0.87	0.60

FAIRFIELD COUNTY MATH LEAGUE (FCML) 2012-2013

Match 1 Round 6
Coordinate
Geometry

1.) $2\sqrt{65}$

2.) $\left(\frac{13}{2}, \frac{11}{2}\right)$ or $\left(\frac{-3}{2}, \frac{-5}{2}\right)$

3.) -3

1.) An isosceles trapezoid has vertices at (0,0), (3,4), (7,4), and (10,0). Find the perimeter of the quadrilateral formed by connecting the midpoints of the adjacent segments of the trapezoid.

2.) The line segment with endpoints (k,1) and (3,k) has length $\sqrt{(130)}$. Find all possible sets of coordinates for the midpoint of the segment.

3.) A circle of radius 5 units is centered at the origin. Find the product of the slopes of the two lines that are both tangent to the circle and pass through (0,10)

FAIRFIELD COUNTY MATH LEAGUE (FCML) 2012-2013 Match 1 Team Round

1.) $2500

2.) $-\frac{70}{27}$

3.) $\frac{3\sqrt{3}}{4}$

4.) $\frac{4}{9}$ and $\frac{3}{4}$

5.) $\frac{\sqrt{6}-\sqrt{2}}{2}+\sqrt{3}$ or $\frac{\sqrt{6}-\sqrt{2}+2\sqrt{3}}{2}$

6.) (-3, 6.5) (-1, 2.5)

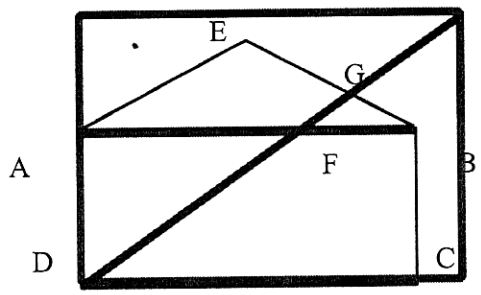
1.)Three investments totaling $12000 are invested into stocks A, B, and C, which return 4%, 5%, and 6% of the investment per year respectively. The total interest earned at the end of the first year is $610. The interest earned on stock B is $10 less than the sum of the combined interest earned on stocks A and C. How much money was invested in stock A?

2.) Solve for x: $$2[2(2x+3)+3]+3=\frac{1}{2}\left|\frac{1}{2}\left(\frac{1}{2}x+\frac{1}{3}\right)+\frac{1}{3}\right|+\frac{1}{3}$$

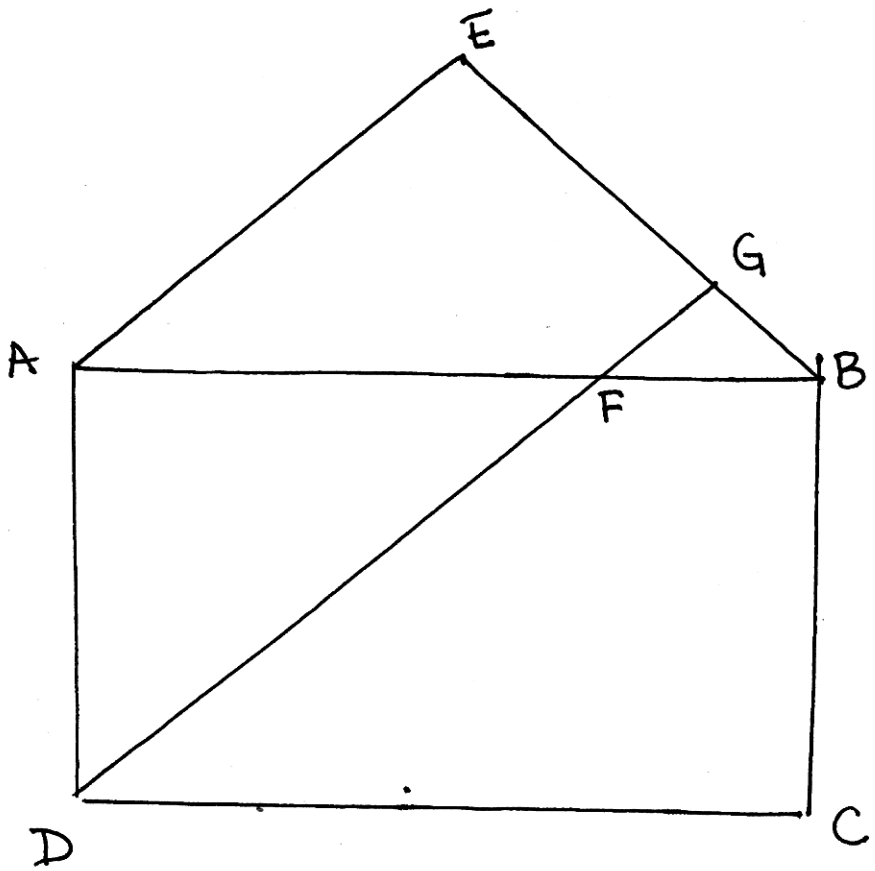
3.) Two wires of equal length are bent into two shapes, one a square and the other an equilateral triangle. Find the ratio (area of square):(area of triangle). Express your answer in lowest terms.

4.) The product of two numbers is 1/3. The sum of their reciprocals is 43/12. Find the two numbers.

5.) Rectangle ABCD has AB=CD=4 and BC=AD=3. An isosceles triangle ABE with vertex angle of 120 degrees at E is created using AB as the base. [A line is drawn from D intersecting AB at point F and BE at point G such that the measure of angle FDC is 45 degrees. Give the exact perimeter of triangle BFG.



6.) Find the coordinates of all points along the perpendicular bisector of the segment whose endpoints are (-3,4) and (-1,5) such that the distance between the desired points and each of the endpoints of the original segment is 2.5 units.


E
G
A
B
F
D
C